

- ART. XXI.—1. *A Knowledge of Living Things, with the Laws of their Existence.* By A. N. BELL, A. M., M. D.; late P. A. Surgeon U. S. Navy; Physician to Brooklyn City Hospital. New York: Baillière Brothers, 440 Broadway, 1860.
2. *The Physiology of Common Life.* By GEORGE HENRY LEWES, author of "Sea Side Studies," "Life of Goethe," etc. In two volumes. New York: D. Appleton & Co., 443 & 445 Broadway, 1860.
3. *Studies in Animal Life.* By the same author. New York: Harper & Brothers, 1860.

THOUGH designed chiefly for popular reading and study, the subject-matters of these works are such as to render an examination of them appropriate in a *Medical Journal*. They have one common aim, viz: the instruction of the community in a branch of science which is attracting increasing attention. We have long regarded instruction therein, not only as legitimate in the higher class of seminaries and colleges, but as a subject which should more extensively engage the attention of medical men, for their own benefit, as well as for the general good.

1. The first book on our list both in design and execution, with some exceptions, which we may presently allude to, conveys much valuable and interesting knowledge, and is well adapted to promote a regard for natural science and personal hygiene. It may be said to consist of two parts. In the first, the reader is presented with a succinct view of the progress of animal and vegetable life, from the most simple to the most complex forms of organization.

Starting with a description of the very first rudiment of a living being, *the cell*, a clear and comprehensive account is given of the mode in which that simplest form of life is gradually developed, with successively higher forms of organization, until the highest and most complex of all—the *mammal*. The various stages of increase in organization are happily illustrated, both by references to animal and vegetable objects, and abundant pictorial illustrations, rendering the elemental operations of life familiar to ordinary minds, and, in our judgment, despite the assertion of the author to the contrary, both "entertaining to the general reader," and "comprehensible to the academic student."

The first part of the volume (according to *our* division of it) concludes with a chapter on "The Consummation of Organic Development," whence the step is direct to a consideration of the conditions which sustain "the erect stature and expressive countenance of *man*," and the remaining half of the volume is devoted to a brief synopsis of human anatomy and physiology.

A rapid and "sketchy" account is given of the various tissues, the cellular, the adipose, the muscular, the osseous, the cutaneous, the nervous; and following these, the subjects of aliment, digestion, circulation, and respiration, have each a few pages devoted to them, while a comparatively minute and protracted exposition of the *senses*, claims a much larger share of attention, and the volume concludes with a philosophical disquisition on "our functions and faculties," and what is rather singularly denominated "the sum of life," as it is rather an essay on disease and death than life. Passing what we regard as an error very common in works of this popular character, the undue proportion of space devoted to a comparatively unimportant point of physiology and anatomy—the senses—we have to allude to one or two other matters which deserve a more accurate rendering than is here given them, especially as they pertain to questions which are at the present time pretty freely and frequently discussed in general circles. Thus, speaking of the means usually employed in warming dwellings, we find on page 192 the following:—

"Water is placed near furnaces *ostensibly* to supply moisture, it being assumed that the highly heated air by furnaces is deficient of (in?) natural moisture and too dry for healthy respiration. Such air is, indeed, very injurious and very irritating, but the remedy is worse than the disease."

In this we differ from the author *in toto*. It is impossible to heat the atmo-

sphere of a dwelling, by any artificial means whatever, without a greater or less desiccation of the air, and unless the increased and unnatural dryness is compensated by vapour from some artificial source, the atmospheric demand for moisture will be supplied, to a greater or less degree, from the lungs and skin of those who inhale the over-dried air. It is the rapid evaporation from the cutaneous and respiratory surfaces that principally gives to the ordinary furnace-heated air its harsh and uncomfortable sensation, a result which can only be obviated, either by a rapid ventilation, and the influx of copious quantities of fresh external air, or by the artificial addition of moisture, by the evaporation of water placed in the air-chamber of the furnace, or better still the occupied apartment.

Dr. Bell very properly objects to the practice of too closely shutting the damper of a furnace or stove, but he gives as the reason, that "burning coals, after they have ceased to smoke, always give off carbonic acid in large quantities," which contaminate the air of the apartment. We would suggest that if anthracite coal is here alluded to (and this is almost the only fuel used in furnaces and stoves in this country), it gives off no *smoke* while burning, and the gaseous products of its combustion consist largely of carbonic *oxide*, as well as carbonic acid. The pungent larynx-irritating, cough-exciting ingredient of the air from a leaky furnace is chiefly the former; that which burns with a lambent blue flame, on the surface of an anthracite fire.

In the chapters on "Aliment and Digestion," and on "Respiration," we have a lucid statement of the most important points of these most important processes, well adapted to ordinary comprehension; but there are a few paragraphs which, either from a want of clearness of expression, or some other cause, convey erroneous impressions. Thus, on p. 226, paragraph 541 contains as many inaccuracies as periods; and while the next paragraph (542) asserts that the carbonic acid emitted from burning gas or candles "mixes, when cool, with the other heavy exhalations, and occupies the lower strata;" this is directly contradicted, and the facts correctly stated, in paragraph 549.

So also we are told, on page 196, that "the individual can *only* be sustained by an organic, and not by, an inorganic food;" and yet in the next two lines it is contradictorily and correctly said, "It must not be supposed, however, that inorganic substances are useless in the nutrition of animals. On the contrary, the gases and minerals introduced with the water and nutritious decoctions, together with the ashy constituents and the salts, \* \* \* all conduce to the necessities of animal existence." And again, "The substances required by animals for their sustenance and growth are of two kinds, the organic and the inorganic." These irreconcilable statements have probably escaped the author's attention, in the passage of the book through the press.

Though the opinion is not directly expressed, Dr. Bell seems inclined to the chemical theory of Liebig, on the subject of food, which Mr. Lewes, in his work on physiology, above mentioned, takes much exception to, and argues against, with no little acumen, especially in reference to the value of inorganic substances, which are to be considered in the light of food, as much as any of the organic matters used as such.

We are strongly tempted, at this point, to anticipate the course of our review of the works before us, and take up the discussion of the chemical theory of food, by quoting from the first volume of Mr. Lewes some of his remarks in answer to Liebig on this exceedingly interesting subject. But a desire to adhere to the plan marked out in this review, and the demand for the consideration of other important points, forbid the indulgence; but our readers will find, in the perusal of the *Physiology of Common Life*, a free and intelligent critique of the favourite idea of Liebig, enforced by quotations of facts, and other physiological writers, which carry great weight, and will be found of no little value in medical practice.

There are some other minor points and modes of expression and orthography (*e. g.*, *Lichen Icelandica*) to which a critic might take exception, but they are, perhaps, of insufficient consequence to justify further allusion, and some of the physiological facts presented are not fully up to the standard of the most recently obtained results.

The three works before us constitute a regular series (though of course unin-

tentional) of instruction on the subjects of which they treat. The first being elemental in character, is well adapted, under the guidance of a proper instructor, to serve as a text-book of the rudiments of physiology, for the use of schools, &c., while the second seems as if intended, as it certainly is well adapted, to lead the popular student through the next succeeding steps; and the third forms a fitting apex to the pyramid of instruction in living things.

2. To the productions of Mr. Lewes we, therefore, now turn with no little gratification and profit. Unknown to us before introduced by these works, we have been most agreeably disappointed, and even surprised, at the evidences of thorough familiarity with the subjects upon which he treats, the originality of his views, the exceedingly happy manner by which he takes his reader along with him, and the abundance of his illustrations and elucidations. We had little idea how, like an agreeable picture, the inner organism of animal life could be laid open to view, and how pleasant, and even amusing, a tale could be made of a description of its functions and sensations. The author is, in fact, a writer of great power; combining fervency of thought, and force and copiousness of language, with imagery partaking of the poetical, yet withal an experimentalist, and a practical and minute observer, of a too rare type.

To our mind, he is to animal physiology what Hugh Miller was to geology, an original and acute observer, and a vivacious expositor.

Though by no means the best we could select, as a specimen of his descriptive powers, we present the opening paragraphs of his first volume, from the chapter on "Hunger and Thirst."

"Hunger is one of the beneficent and terrible instincts. It is, indeed, the very fire of life, underlying all impulses to labour, and moving man to noble activities by its imperious demands. Look where we may, we see it as the motive power which sets the vast array of human machinery in action.

"It is hunger which brings these stalwart navies together in orderly gangs to cut paths through mountains, to throw bridges across rivers, to intersect the land with the great iron ways which bring city into daily communication with city. Hunger is the invisible overseer of the men who are erecting palaces, prison-houses, barracks, and villas. Hunger sits at the loom, which with stealthy power is weaving the wondrous fabrics of cotton and silk. Hunger labours at the furnace and the plough, coercing the native indolence of man with strenuous and incessant activity. Let food be abundant and easy of access, and civilization becomes impossible; so indissolubly dependent are our higher efforts on our lower impulses. Nothing but the necessities of food will force man to that labour which he hates, and will always avoid when he can. And although this seems obvious only when applied to the labouring classes, it is equally though less obviously true when applied to all other classes, for the money we all labour to gain is nothing but food, and the surplus of food, which will buy other men's labour.

"Hunger, although beneficent, is no less terrible. When its progress is unchecked, it becomes a devouring flame, destroying all that is most noble in man. Hunger is a stimulus to crime, no less than to honest labour. It wanders through dark alleys, whispering desperate thoughts into eager ears; and it maddens the shipwrecked crew till they cast away all shame, all pity, all desire of respect, and perpetrate deeds which cannot be mentioned without horror. Hunger subjugates the humanity in man, and makes the brute predominate. Impelled by this ferocious instinct, men have eaten their companions, and women have eaten their own children. Hunger has thus a twofold character; beside the picture of the activities it inspires, we must also contemplate the picture of the ferocities it evokes."

Again, when speaking of the "causes of hunger," the author thus demolishes a favourite popular theory: "The animal body is often compared with a steam-engine, of which the *food* is the *fuel* in the furnace, furnishing the motive power. As an illustration this may be acceptable enough; but, like many other illustrations, it is often accepted for a real analogy, a true expression of the facts. As an analogy its failure is conspicuous. No engine burns its *own substance* as fuel; its motive power is all derived from the coke consumed; when the coke is exhausted the engine stops. But every organism consumes its own body; it

does not burn food, but tissue. The fervid wheels of life were made out of food, and in their action motive power is evolved.

"The difference between the organism and the mechanism is this: the production of heat in the organism is not the *cause* of its activity but the *result* of it; whereas, in the mechanism, the activity originates in, and is sustained by, the heat. Remove the coals which generate the steam, and you immediately arrest the action of the mechanism; but long after all the food has disappeared, and become transformed into the solids and liquids of the living fabric, the organism continues to manifest all the powers which it manifested before."

Not the least interesting points of these volumes are the freedom and skill exhibited by their able author in combating the views of several distinguished physiologists, whose theories have found very general acceptance, derived from what appear to be exact and conclusive experiments. The chemical and physiological theories of Liebig, Marshall Hall, Flourens, Gall, Müller, Cuvier, Spallanzani, Leuwenhoek, and others, undergo, in these pages, various vigorous and keen, though perfectly fair and scientific criticism, showing manifest errors, and a setting to rights of the facts in more strict accordance with modern observations. The author is by no means a mere copyist. He is an original experimenter and thinker. His own microscope and knife open the pathways of investigation, and when he finds a fact opposed to the theories which have been laid down by others, he boldly proclaims it, and reasons therefrom with acumen and ingenuity, and in a style which never fails to interest, and often to captivate.

Where there is so much that is interesting, it is not easy to select any one portion of a volume without apparent injustice to all the rest. We must therefore content ourselves with confidently assuring our readers that the *Physiology of Common Life* will satisfy them, that its author is no ordinary writer or observer; and whether his views find general acceptance or not, he certainly presents and maintains them with remarkable clearness and force. Among the latest, so is he also among the most finished, of the now greatly enlarged number of physiological students, who, *con amore*, delight in delving into the hidden mysteries of nature, and like every true student of nature, he hesitates not to seek aid wherever he can find it, giving ample acknowledgment to all from whom he obtains it. His references are copious, and to our own Dalton and Draper as freely and as often as to any. It is a work destined, we believe, to make a decided mark upon the intelligence of the world, and is to be valued not more for the scientific information it conveys, than for the felicitous *popularization* of its style, whereby its facts are brought home to the comprehension of other readers and students than those of the medical profession.

3. The last work of the series before us, *Studies of Animal Life*, while marked by the same vivacity of style, and abounding in instruction, is yet very different from the work just noticed from the same hand. If we were asked to mention the characteristic most prominent in its pages, we should reply, "Enthusiasm." Though disclaiming the idea which some enthusiastic students have promulgated, that

"The proper study of mankind is *cells* ;"

and regarding man as the noblest study, he yet finds under him some other problems which are not to be neglected. Man himself is imperfectly known, because the laws of universal life are imperfectly known. Man forms but the apex of the animal world, and he can only be understood thoroughly by first studying those minuter and obscurer forms, which, though they seldom attract attention, constitute the basis of the pyramid of which he is the apex, and must be conned and made familiar before his biological record can be fully unfolded and comprehended. In the glowing language of our author, "In the air we breathe, in the water we drink, in the earth we tread on, life is everywhere. Nature *lives*: every pore is bursting with life; every death is only a new birth, every grave a cradle! And of this we know so little, care so little! Around us, above us, beneath us, that great mystic drama of creation is being enacted, and we will not even consent to be spectators! Unless animals are obviously useful, or obviously hurtful to us, we disregard them. Yet they are not alien, but akin. The life that stirs within us stirs within them."

With the same design, in many respects, as the work of Dr. Bell before noticed, we are obliged to award to the latter the palm for regularity and system, and a more consecutive method of development of the subject in hand. In fact the variety of topics discussed in this little book of "Studies" of less than 150 pages, is too great to enable an ordinary reader to obtain from it all the satisfaction desired upon any one of them. From the examination of the parasitic animalcule found in the intestinal tube of the frog, which has neither head, nor tail, nor stomach, we are treated to a discussion on the "Fixity of Species," and a biographical sketch of M. le Baron Cuvier, "administrator, politician, academician, professor, dictator," whose simple, ardent, scientific youth, contrasted so widely with his ambitious, political, ceremonious age. Still the ardent lover of nature is traced on every page, and the book is a charming companion, for an evening hour, or a day of summer travel. It is freely illustrated by drawings of microscopic objects, and he tells us, "As a beginning, get a microscope. If you cannot borrow, boldly buy one. Few purchases will yield you so much pleasure; and, while you are about it, do, if possible, get a good one. Spend as little money as you can on accessory apparatus and expensive fitting, but get a good stand and good glasses. Having got your instrument, bear in mind these two important trifles—work by daylight, seldom or never by lamplight; and keep the unoccupied eye *open*. With these precautions you may work daily for hours without serious fatigue to the eye."

Of the numerous anecdotes recited by the author, we quote but one, and this to show the *contagiousness* of the spirit of the seeker of pleasure in the realms of nature.

"Very unintelligible this would be to the passers by, who generally cast contemptuous glances at us when they find we are not fishing, but only removing nothings into a glass jar. One day an Irish labourer stopped and asked me if I were fishing for salmon. I quietly answered 'Yes.' He drew near; I continued turning over the weed, occasionally dropping an invisible thing into the water. At last a large yellow-bellied Triton was dropped in. He begged to see it; and, seeing at the same time how alive the water was with tiny animals, became curious, and asked many questions. I went on with my work; his interest and curiosity increased; his questions multiplied; he volunteered assistance, and remained beside me till I prepared to go away, when he said seriously, 'Och! then, and its a fine thing to be able to name all God's creatures.' Contempt had given place to reverence; and so it would be with others, could they check the first rising of scorn at what they do not understand, and patiently learn what even a roadside pond has of nature's wonders."

J. H. G.

ART. XXII.—*Operative Surgery, adapted to the Living and Dead Subject.*

By C. F. MAUNDER, Part I. and II., complete, London, 1860–61, 12mo. pp. 318.

THIS work has been published, as the author states in the preface, to satisfy the demand which, while conducting a course of operations on the dead subject in Paris, he found to exist in the English Professional Library, for a concise, systematic, and illustrated guide to the operations applicable as well to the dead as to the living subject.

The volume he has compiled, with this view, is very concise, and it is, in some portions, profusely illustrated; but it is not by any means systematic, and while some few subjects are carefully and fully treated, by far the greater number receive a very insufficient notice.

Considerable experience in courses of operative surgery on the dead body has taught us that three subjects engross almost the whole attention of the teacher; these are, special amputations, the ligation of special arteries, and excision of the joints. These three subjects, and these alone, we have found treated of with proper care in the book before us; and upon all other subjects connected with operative surgery, we must pronounce it to be signally defective.

W. F. A.